

## **Through the looking glass: Perspectives on sibilants and sound change in Glaswegian English**

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A key issue for sociophonetic research is how to capture and characterise the relevant aspects of speech which relate to identified social constructs. Acoustic analysis has until recently been relatively 'static'. For example, the complex dynamic patterning of acoustic vowel quality over the timecourse of a vowel's production is typically represented from a single timepoint, or an average across a few timepoints. Recent advances in acoustic phonetics and statistical analyses now allow for both dynamic representation of the phonetic entities for sociophonetic analysis, and statistical consideration of their social correlates which account in different ways for dynamic acoustic representations (see e.g. Docherty et al 2015; Stuart-Smith et al 2015; *Speech dynamics, social meaning, and phonological categories*). Socially-conditioned variation in the production of /s/ is now well-established across several varieties of English (e.g. Stuart-Smith 2007; Levon and Holmes-Elliott 2014) and other languages (e.g. Pharao et al 2014). Reidy (2016) showed that dynamic acoustic analysis helps differentiate /s/ and /ʃ/ in English, and /s/ in English and Japanese; cf Stevens and Harrington (2016). The question for this paper is: does a dynamic acoustic representation help resolve the impact of the social factor of gender over time on /s/ and /ʃ/ in spontaneous Glaswegian vernacular speech?

Glaswegian vernacular has long been noted to show an auditorily-retracted /s/, especially in male speakers (Macafee 1983). Stuart-Smith (2007)'s acoustic analysis of wordlist data collected in the 1990s confirmed a lower peak frequency for male speakers, but also for working-class girls, who are distinct not from working-class boys but from their middle-class counterparts. Glasgow has shown substantial changes over the twentieth century: are shifts in social gender linked to linguistic change? This paper considers the impact of shifting perspective from static to dynamic measures of the sibilants, by gender, over time.

First, a static acoustic analysis was carried out using the peak and front slope (Jesus and Shadle 2002) taken from the long term average spectrum of the duration of 5095 tokens of /s/ and /ʃ/ from 32 middle-aged and adolescent working-class speakers recorded in the 1970s and 1990s. This showed consistently higher peaks in female speakers for /s/ than males, but over time a significant reversal is also found such that girls born most recently show lower peaks than women born in the 1920s. Then, a dynamic acoustic analysis applied to the same data. All instances of stressed initial /s/ and /ʃ/ were extracted and peak, slope, mean and spread measures were taken from a series of spectra (10ms, Hamming window) over the central 70% of the fricative. The resulting time series were subjected to a Discrete Cosine Transformation (DCT) analysis (Harrington 2010; cf Jannedy and Weirich 2017 for DCT for static analysis of German fricatives). The first four DCT coefficients were statistically analysed using linear mixed effects modelling for adjacent phonetic context, gender and decade of birth. These dynamic results confirm the static results but also permit additional insight into spectral shifts over the course of the fricative, which link with social gender over time, effectively providing windows onto both static and dynamic spectral dynamics together.

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